## REMARKS

This application has been reviewed in light of the Office Action dated October 4, 2005.

Claims 1-27 are pending in this application. Claims 1, 2, 12, 13 and 23-27 have been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record. . Support for the claim changes can be found in the original disclosure, and therefore no new matter has been added. Claims 1, 8, 12, 19, 23 and 24-27 are the independent claims.

The specification and the abstract have been carefully reviewed and amended as to matters of form in view of the Examiner's comments with respect to the specification. The specification has been amended at the portions objected to by the Examiner. It is noted that these changes are substantially the same as presented in the Amendment dated August 14, 2003. Approval of the changes is respectfully requested.

Claims 1-27 have been rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,659,664 (*Kaja*) in view of U.S. Patent No. 5,913, 193 (*Huang*). With regard to the claims as currently amended, this rejection is respectfully traversed.

Independent Claims 1, 12 and 23 as currently amended are directed to a control arrangement for speech synthesis apparatus having a database that manages phonemic piece data. In the arrangement, a first polyphone is generated in consideration of the phonemic context for a phoneme as a search target. The database is searched for phonemic piece data corresponding to the first phoneme. A second polyphone is generated in re-searching by changing the phonemic context on the basis of the obtained search result and the database is re-searched for phonemic piece data corresponding to the second polyphone. The search result obtained in the re-searching

is registered in a table in correspondence with the first polyphone.

In Applicant's view, Kaja discloses an arrangement for speech synthesis that provides an automatic mechanism for simulating human speech. A number of control parameters are provided for controlling a speech synthesis device. The control parameters are stored in a matrix or a sequence list for each polyphone. The behavior of the respective parameters with time is defined around each phoneme boundary and polyphones are joined by forming a weighted mean value of the curves which are defined by their two associated matrices/sequences list.

In Applicant's opinion, Huang discloses a concatenative speech synthesis system and method which produces a more natural sounding speech. The system provides for multiple instances of each acoustic unit which can be used to generate a speech waveform representing an linguistic expression. The multiple instances are formed during an analysis or training phase of the synthesis process and are limited to a robust representation of the highest probability instances. The provision of multiple instances enables the synthesizer to select the instance which closely resembles the desired instance thereby eliminating the need to alter the stored instance to match the desired instance. This in essence minimizes the spectral distortion between the boundaries of adjacent instances thereby producing more natural sounding speech.

According to the invention of Claims 1, 12 and 23, a first polyphone is generated in consideration of a phoneme context for a phoneme as a search object. A database is searched for phonemic piece data corresponding to the first phoneme. A second polyphone is generated by changing the phonemic context on the basis of the search result. The database is re-searched for phonemic piece data corresponding to the second polyphone. The result of the re-search is registered in a table in correspondence with the first polyphone.

As noted, Kaja discloses a speech synthesis arrangement in which speech parameters are stored for each polyphone. At lines 31-43 of column 3 of Kaja, it is disclosed that the stored control parameters are produced by carrying out copying synthesis of natural speech. To do this, Kaja teaches using an iterative process which make a synthetic phrase more and more like a natural phrase e.g., by some iterative comparison method to obtain control parameters corresponding to a good likeness. In contrast to Kaja's iterative process comparison of a synthetic phrase with a natural phrase, it is a feature of Claims 1, 12 and 23 that a first polyphone is selected for a phoneme by searching for phonemic piece data. Based on the search result, the phonemic context is changed to generate a second polyphone and the database is re-searched for phonemic piece data corresponding to the second polyphone. The re-search result phonemic piece data is registered in a table in correspondence with the first polyphone. Accordingly, Kaja' iterative comparison of synthetic phrase with a natural phrase to obtain control parameters (e.g., formants), is not seen as suggesting in any manner the searching phonemic piece data to obtain a first and changed context second polyphone and then registering the phonemic piece data found in a database re-search based on the second polyphone in correspondence with the first polyphone.

Huang et al. has been cited as teaching the use of a table to store a search result of synthesis parameters. The Huang arrangement, however, only teaches a storage of phonemic descriptions of words in a dictionary storage 22, a separate table of senones stored in an HMM storage 34 and a table of multiple instances of each diphone. There is, however, no suggestion in Huang et al. of registering re-search obtained phonemic piece data in correspondence with polyphones as in Claims 1, 12 and 23. Neither Kaja nor Huang et al. in any manner suggests searching databases of phonemic piece data to select polyphones or the re-search of a phonemic

piece database to register the search result phonemic piece data in correspondence with the searching polyphone as in Claims 1, 12 and 23. It is therefore not seen that the addition of Huang et al.'s senone or multiple instance diphone tables devoid registering phonemic piece data with polyphones to Kaja's iterative comparison of synthetic phrase with a natural phrase to obtain control parameters without any suggestion of database searches could possibly suggest the features of Claims 1, 12 and 23. It is therefore believed that Claims 1, 12 and 23 as currently amended are completely distinguished from any combination of Kaja and Huang et al. and are allowable.

Independent Claims 25-27 as currently amended are directed to an arrangement of a speech synthesis apparatus having a database that manages phonemic piece data. In the arrangement, a polyphone is generated in consideration of phonemic context for a phoneme as a search target. The database is searched for phonemic piece data corresponding to the polyphone. The data base is re-searched for phonemic piece data corresponding to the phoneme and the search result obtained in re-searching is registered in a table in correspondence with the polyphone.

In accordance with Claims 25-27, a polyphone is generated in consideration of the phonemic context of a phoneme as a search target. A database that manages phonemic piece data is searched for phonemic piece data corresponding to the polyphone and the database is researched for phonemic piece data corresponding to the phoneme. The search result phonemic piece data corresponding to the phoneme is registered in a table in correspondence with the generated polyphone.

As discussed with respect to Claims 1, 12 and 23, Kaja teaches using an iterative process which make a synthetic phrase more and more like a natural phrase e.g., by some iterative comparison method to obtain control parameters corresponding to a good likeness. The Kaja disclosure, however, is devoid of any suggestion of searching a database that manages phonemic piece data corresponding to a polyphone generated in consideration of a phoneme. It is not seen that the iterative comparison of a synthetic phrase and a natural phrase to improve control parameters of the synthetic phrase could possibly suggest the database searching arrangements of Claims 25-27 which provide a table of phonemic piece data for a phoneme in correspondence with a polyphone generated from the phoneme. Huang et al. is devoid of any suggestion of a database that manages phonemic piece data and only has tables of senones stored in an HMM storage 34 multiple instances of each diphone none of which in any manner suggest a database of phonemic piece data searchable by polyphones. Accordingly, it is not seen that the addition of Huang et al.'s senone and diphone instance tables devoid of any searchability of phonemic piece data or tables of phonemic piece data - polyphone correspondence to Kaja's iterative comparison of synthetic speech with natural speech rather than database searching could possibly suggest the features of Claims 25-27. It is therefore believed that Claims 25-27 as currently amended are completely distinguished from any combination of Kaja and Huang et al. and are allowable.

Pending independent Claims 8, 19 and 24 are directed to control arrangements for speech synthesis apparatus that performs speech synthesis by using phonemic piece data managed by a database. In the arrangement, a table for managing position information indicating the position of phonemic piece data in the database is stored in correspondence with a phoneme obtained in consideration of phonemic context made to correspond to the phonemic piece data. Phonemic

context information of the phoneme as a synthesis target and fundamental frequencies corresponding thereto are acquired and the average of the acquired fundamental frequencies is calculated. A phoneme group corresponding to the phonemic context information from the table is searched. Position information of the phonemic piece data corresponding to a predetermined phoneme of the searched phoneme group is acquired from the table on the basis of the calculated average fundamental frequencies. The phonemic piece data indicated by the acquired position information from the database is acquired and the prosody of the acquired phonemic piece data is changed.

It is a feature of Claims 8, 19 and 24 that stores a table that manages position information of phonemic piece data in a phonemic piece data database. A phoneme group is searched corresponding to acquired phonemic context information and acquiring position information of phonemic piece data corresponding to a predetermined phoneme of the searched phoneme group on the basis or calculated average fundamental frequencies corresponding to the acquired phonemic context information. Phonemic piece data indicated by position information is acquired from the database and the prosody of the acquired phonemic piece data is changed.

As discussed with respect to Claims 1, 12, 23 and 25-27, Kaja only teaches using an iterative process which makes a synthetic phrase more and more like a natural phrase e.g., by some iterative comparison method to obtain control parameters corresponding to a good likeness but is devoid of any suggestion of searching a database that manages phonemic piece data or of a position information managing table. Huang et al. only has tables of senones stored in an HMM storage 34 and of multiple instances of each diphone none of which in any manner suggest a database of phonemic piece data or a phonemic piece data position information table. Neither

Kaja nor Huang et al. discloses use of a table of position information on phonemic piece data to acquire phonemic piece data to change the prosody of the acquired phonemic piece data as in Claims 8, 19 and 24. Since both Kaja and Huang et al. are devoid of any suggestion of using a data base of phonemic piece data and a table of position information of phonemic piece data, it is not seen that any possible prosody changing performed by these references could possibly suggest the features of Claims 8, 19 and 24. It is therefore believed that pending Claims 8, 19 and 24 are completely distinguished from any combination of Kaja and Huang et al. and are allowable.

Acknowledgment of the Claim to Priority and receipt of the certified copy of the priority document in the above-identified application are respectfully requested.

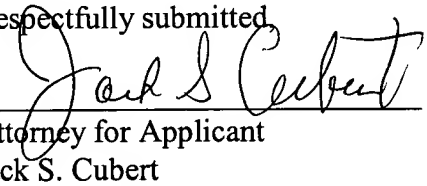
A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's attorney, Douglas W. Pinsky, may be reached in our Washington office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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